Dredged Material Management: CADs, Treatment, & Upland Considerations

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Management Alternatives

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Some Alternative Environmental Issues (1)

Impacts	Open-Water	Island	Upland	Treat-ment	No Dredging
Dredging	■	■	■	■	
Transfer Losses	■	■	■	■	
Storm	■	■			■
Truck			■	■	
Staging Area			■	■	

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Some Alternative Environmental Issues (2)

Impacts	Open-Water	Island	Upland	Treat-ment	No Dredging
Aquifer		●	■	●	
Neighbor-hood		■	■	■	■
Leachate Treatment		●	■		
Extractant Disposal				■	
Water Quality	■	■	●	●	■

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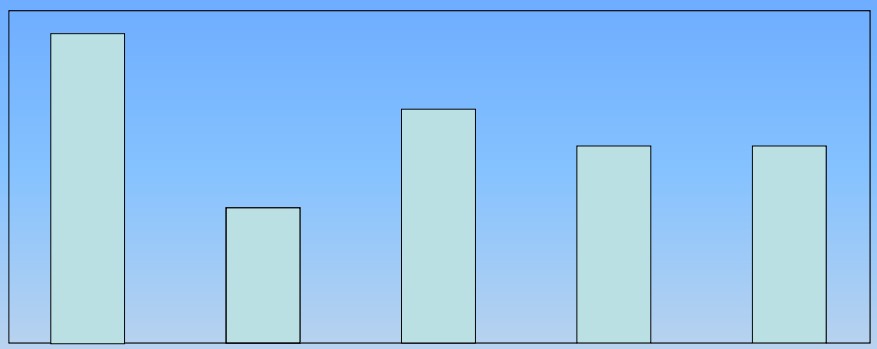
Comparative Risk*



* After Kane-Driscoll et al., 2002

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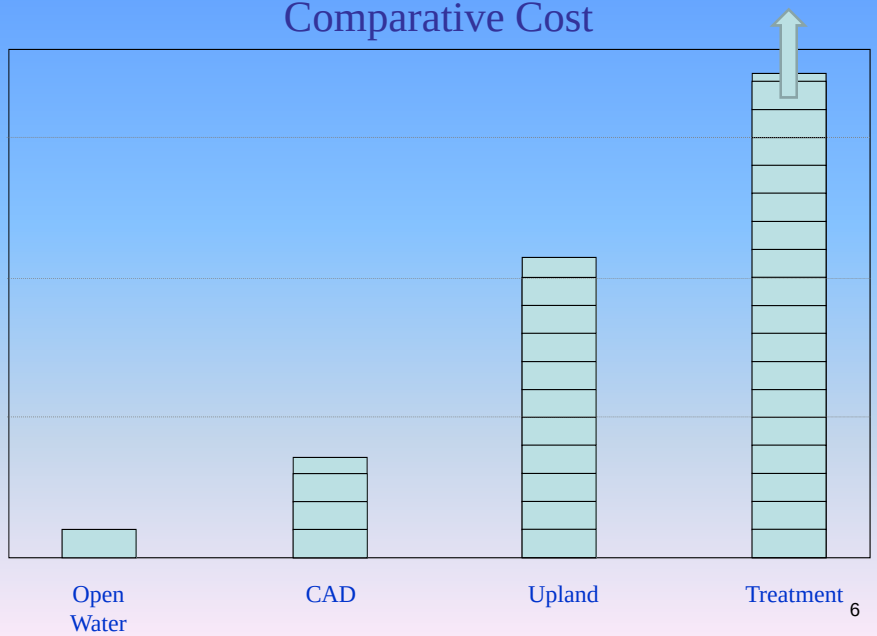
Comparative Cost



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Ted Williams Tunnel – Upland

> $150/CY (1990)

7

1 MCY = 64 ac @ 10 ft

8

Geotextile Tube Dewatering/Storage

Images Compliments of Mineral Processing Services, LLC, South Portland , ME

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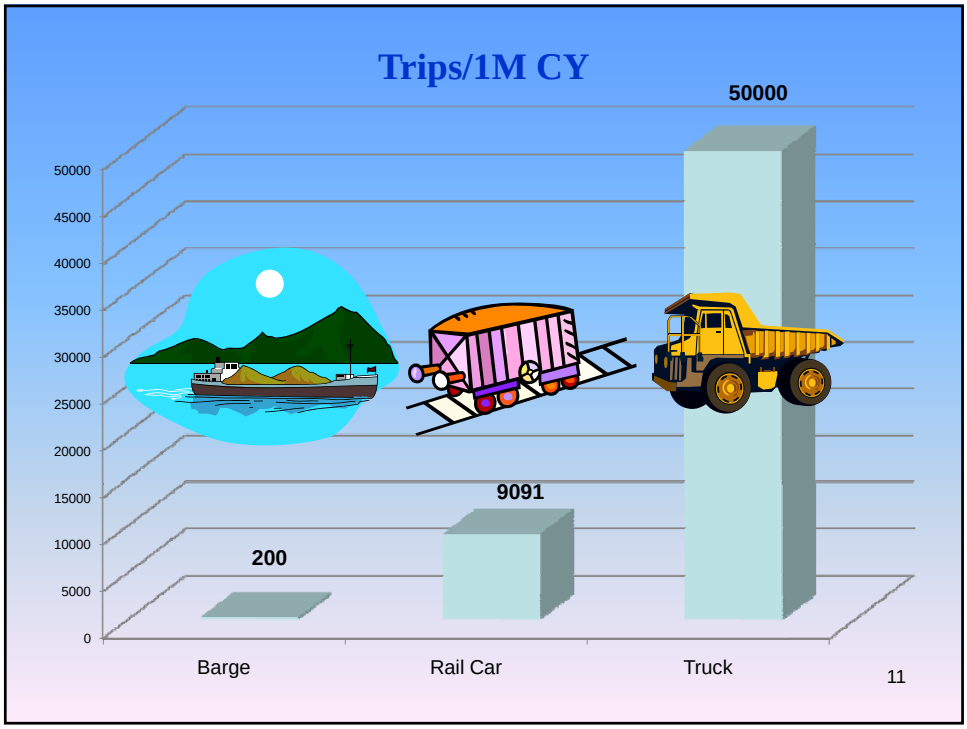
Sediment Treatment

- Small Volumes
- Low Process Rates
- Needs Accessible Site
- High Cost
- Residual Disposal


Trips/1M CY
50000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
9091
200
Barge
Rail Car
Truck
11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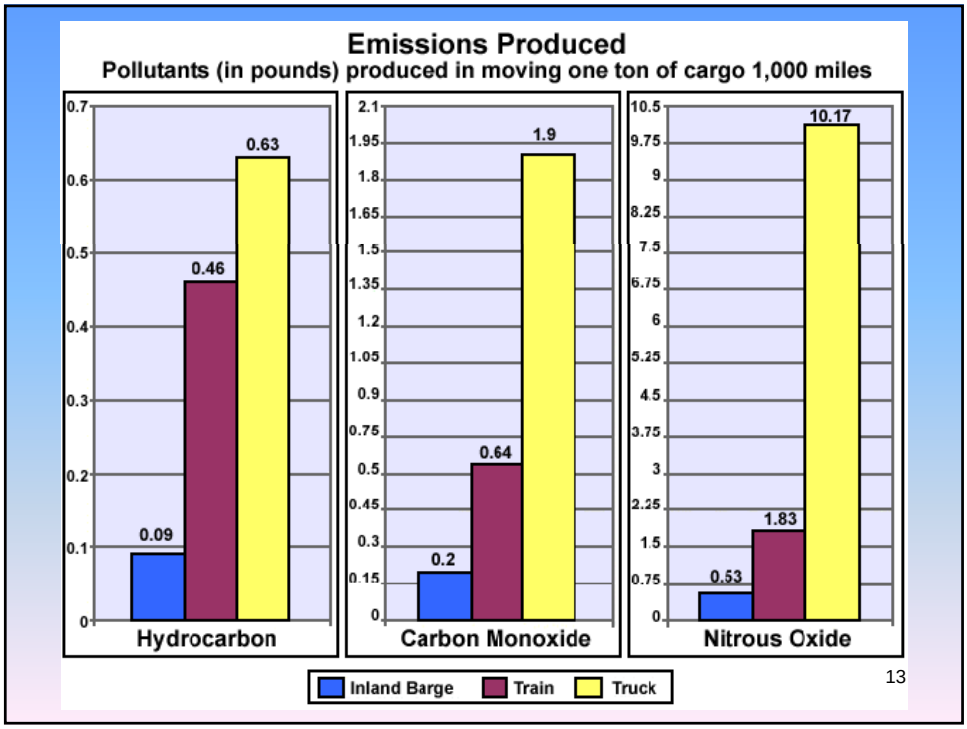
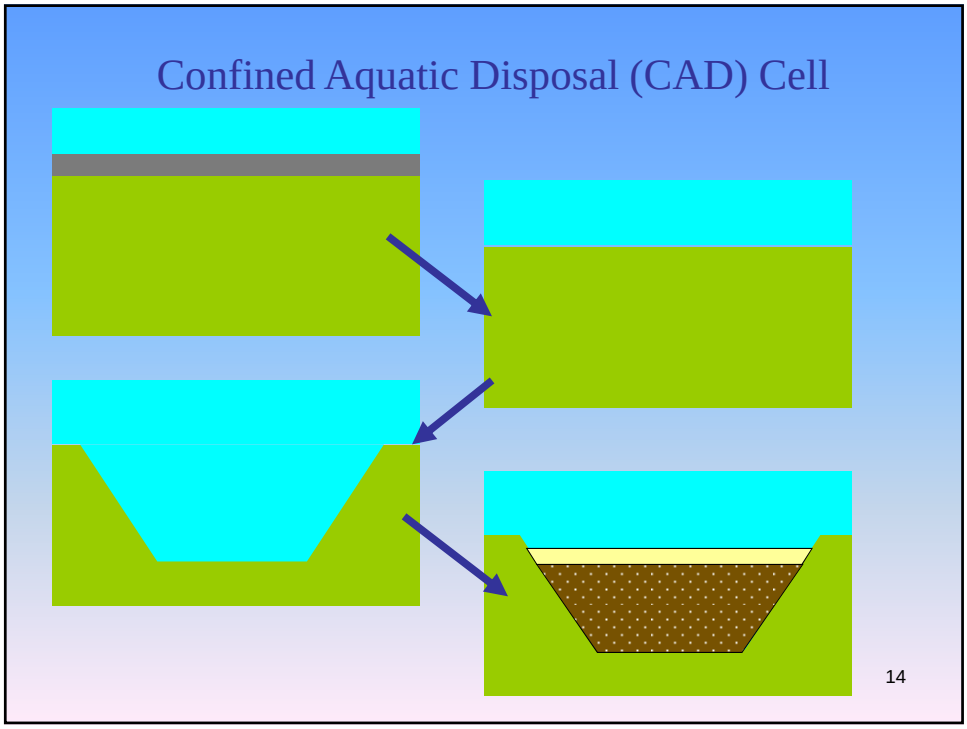
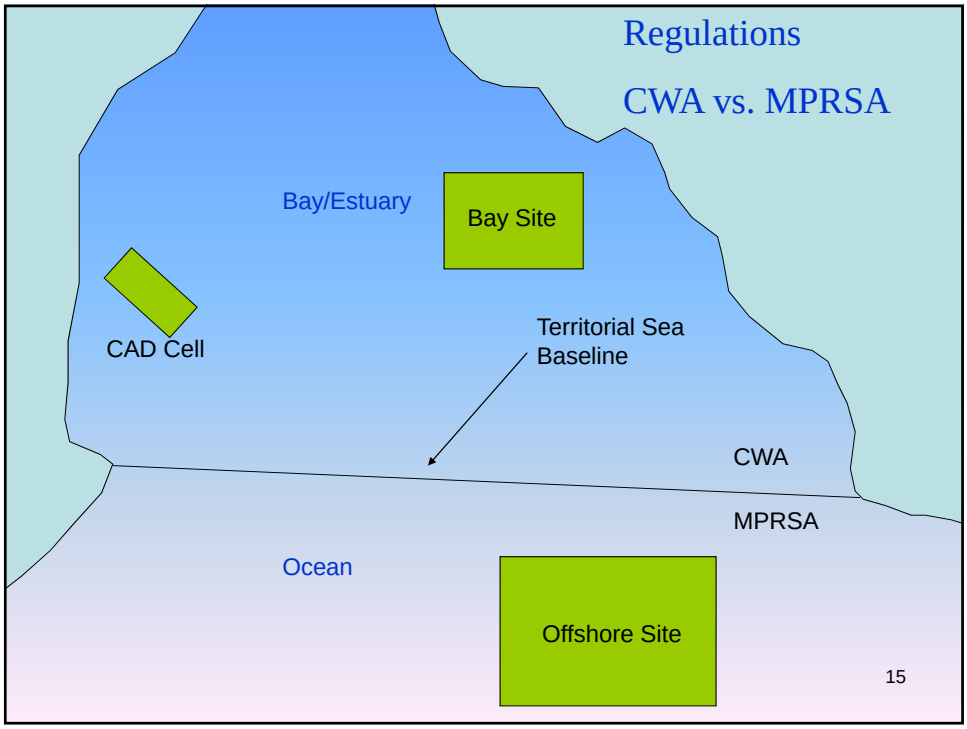

Emissions Produced
Pollutants (in pounds) produced in moving one ton of cargo 1,000 miles
0.09
0.46
0.63
Hydrocarbon
0.2
0.64
1.9
Carbon Monoxide
0.53
1.83
10.17
Nitrous Oxide
Inland Barge
Train
Truck
13


Confined Aquatic Disposal (CAD) Cell
14


Regulations
CWA vs. MPRSA
Bay/Estuary
Bay Site
CAD Cell
Territorial Sea
Baseline
CWA
MPRSA
Ocean
Offshore Site
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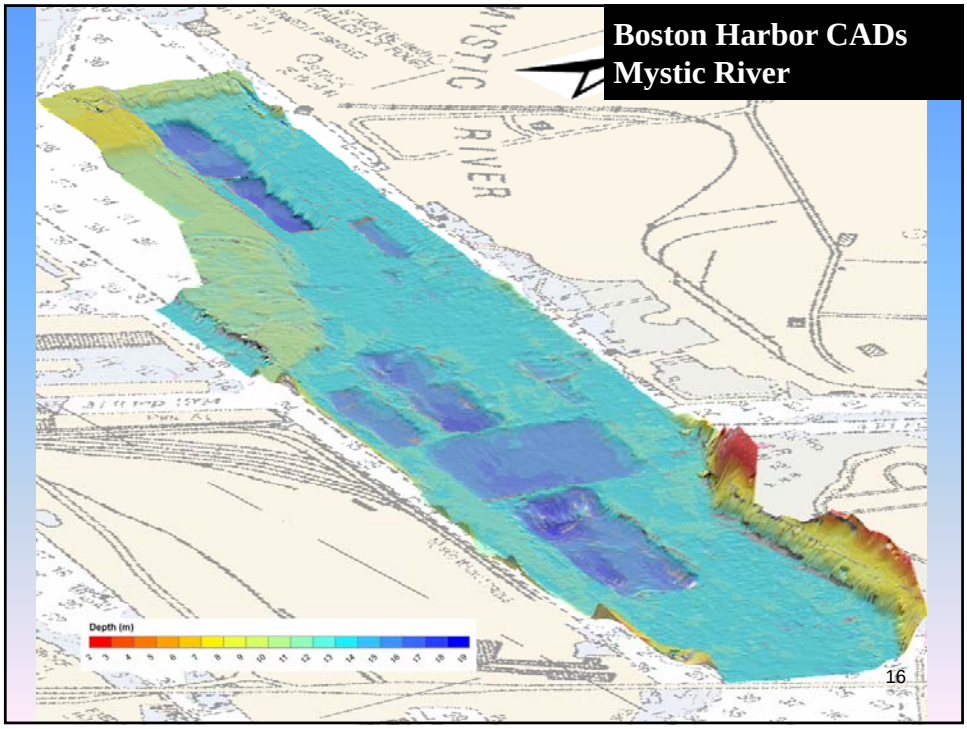
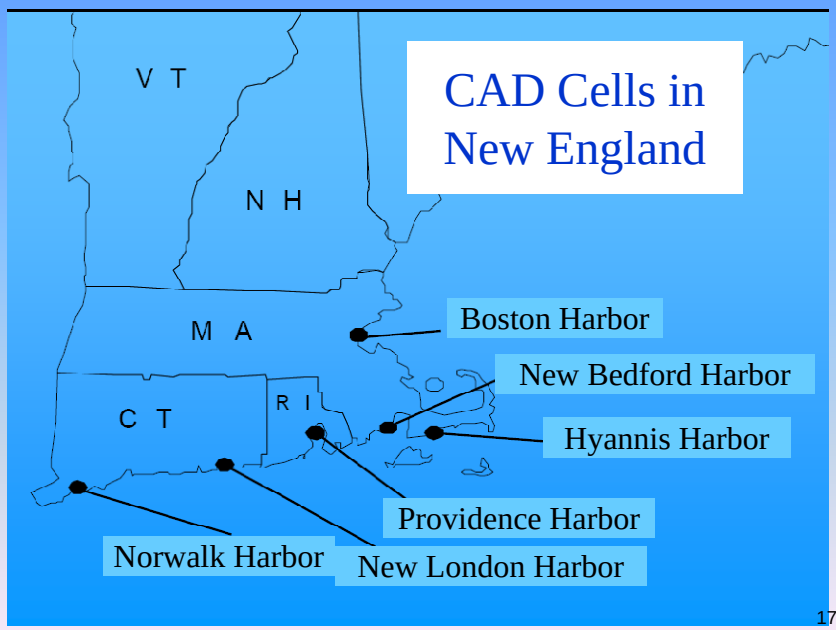
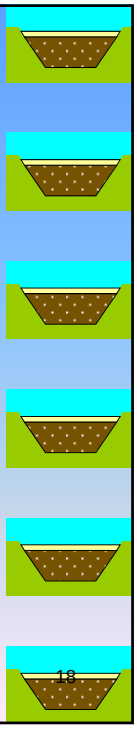

Boston Harbor CADs
Mystic River
Depth (m)
16



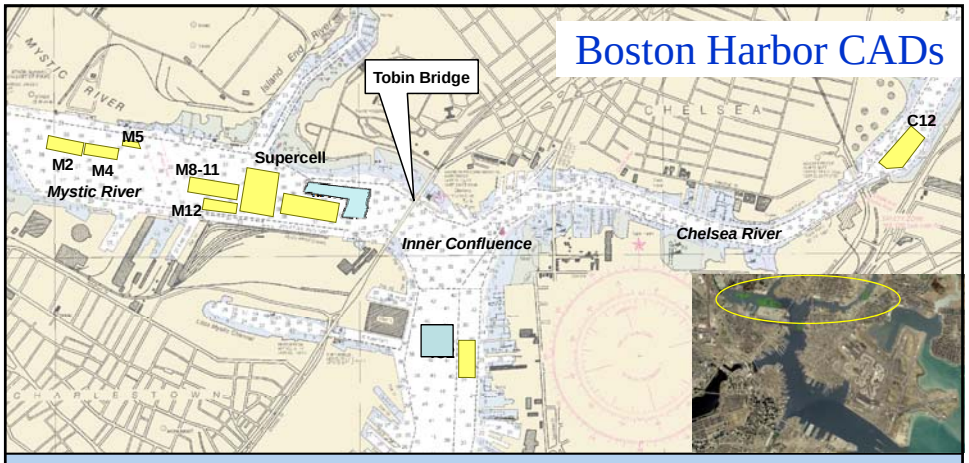
NE CAD Alternative Experience

Confined Aquatic Disposal Cells

- 1981 – Norwalk Harbor, ~ 2,500 cu m
- 1989 – New Bedford Harbor Pilot
- 1997-2000 – Boston Harbor, 1,200,000 cu m
- 1998 – Hyannis Harbor, 57,000 cu m
- 2003-? - Providence Harbor, 900,000 cu m
- 2006 - Norwalk Harbor, 27,000 cu m
- 2005-? – New Bedford Harbor - TBD
- 2006 - New London Harbor, 117,000 cu m
- 2008-2010 – Boston Harbor
- 2010 – New London Harbor



Boston Harbor CADs



- 11 cells total, with approximately 2 million cy excavated up to 60 feet below the surrounding harbor bottom
- 1 cell in 1997, 5 cells in 1998, 3 cells in 1999, and 2 cells in 2008
- 8 cells were capped between 1997 and 2000, C12 remains uncapped with additional capacity, capping recently completed for 2008 cells

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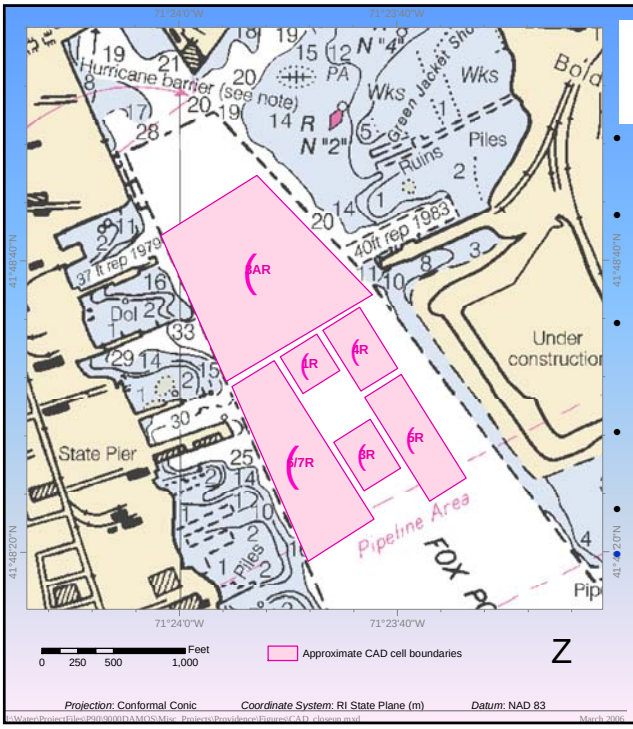
Providence CADs - data collection



- Extensive characterization data as part of EIS
- Extensive water column monitoring program as part of permit for disposal
- Additional monitoring of dredging performed by ERDC
- Ongoing RICRMC monitoring of bathymetry
- Full project summary report
- 2009 bathymetry, SPI, and video transects survey

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Other CAD Alternative Experience

1981 – Rotterdam, Netherlands, 1.1 MCY

1984 – Seattle, WA Duwamish, 1100 cy

1987 – One Tree Island Marina, WA

1992 - Hong Kong, 13 MCY

1992 – Ross Island, Portland OR, 160 KCY

1997 - Newark Bay, 2 MCY

2000 – Puget Sound Naval Shipyard, 377 KCY

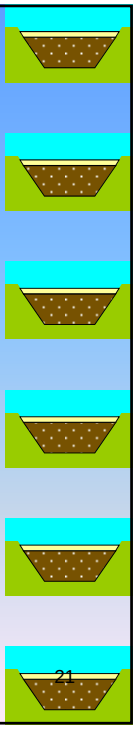
2001 - Los Angeles, Energy Island, 100 KCY

2006 – Oslofjord, Norway, 880 KCY

2008 - Port Hueneme, CA, 327 KCY

2008 – Melbourne, Australia, 23 MCY

2010 – Manila, Philippines



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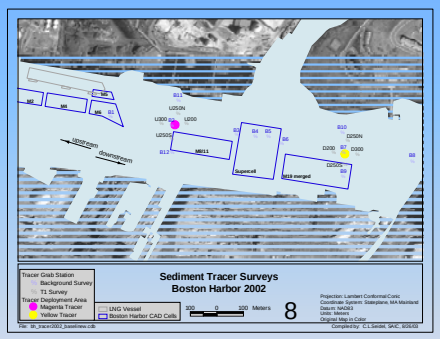
CAD Considerations

- Geology
- Cost
- Capacity
- Channel Deepening
- Capping?



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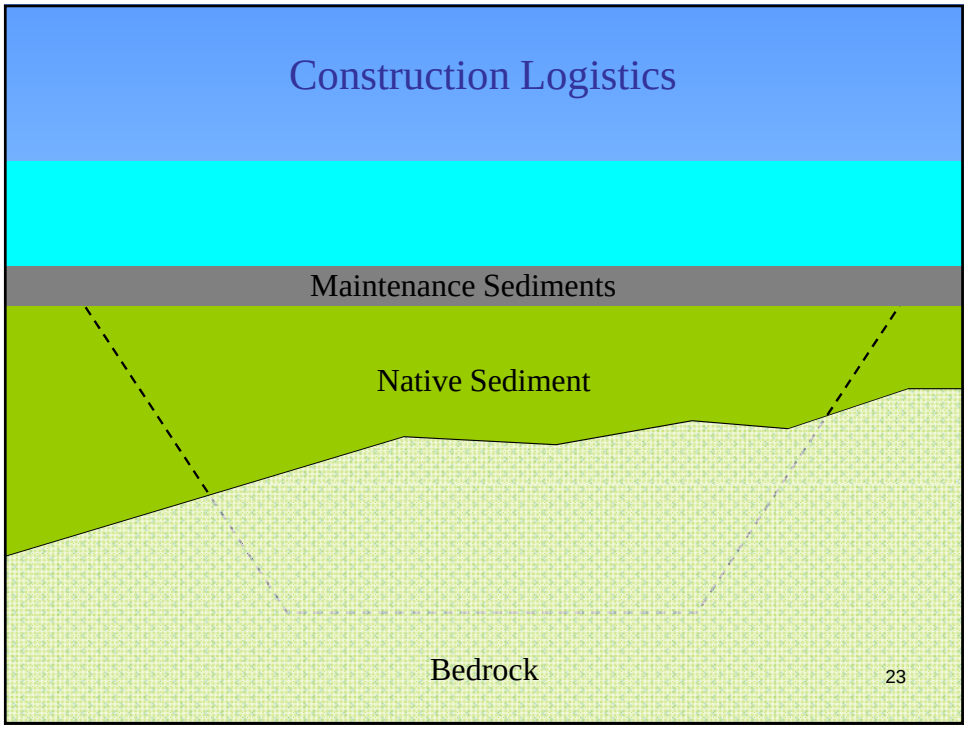
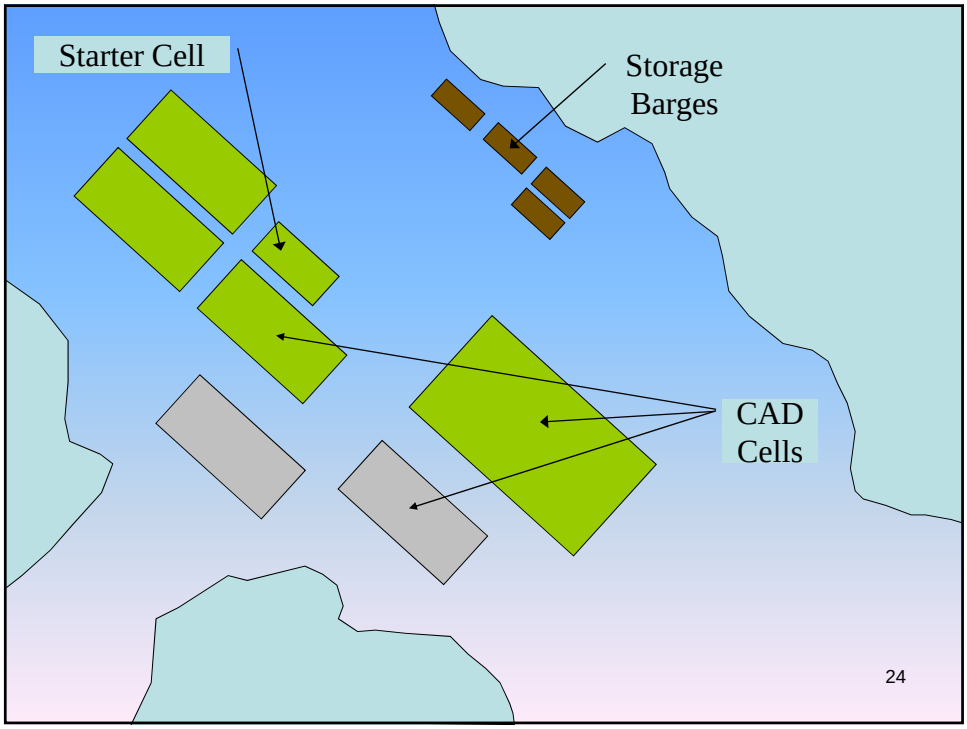

Construction Logistics
Maintenance Sediments
Native Sediment
Bedrock
23


Starter Cell
Storage
Barges
CAD
Cells
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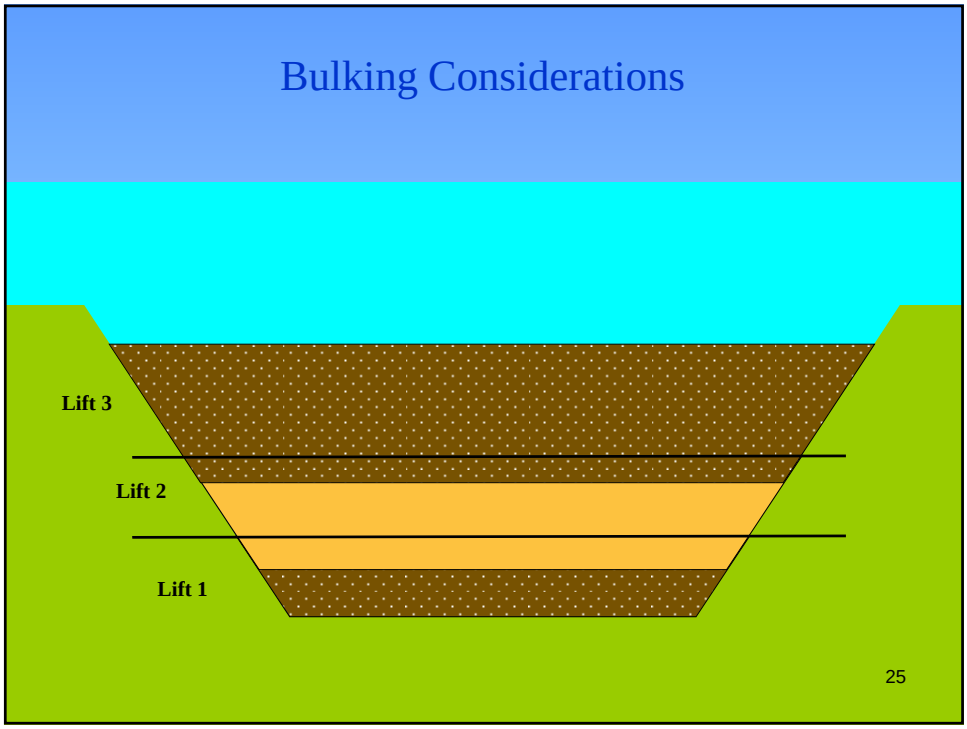
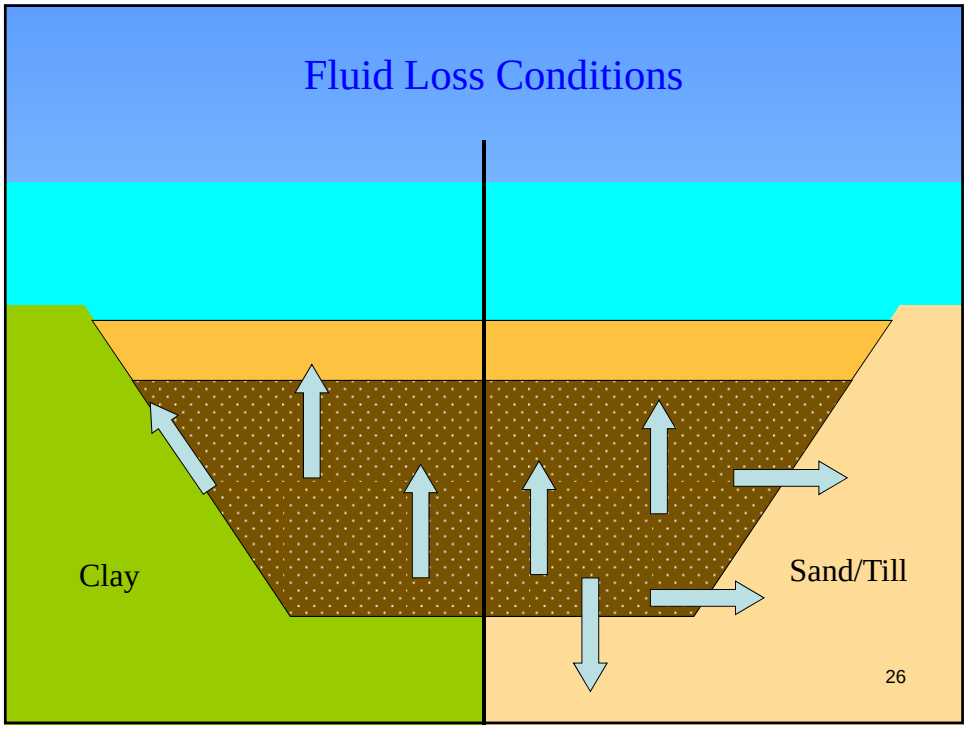
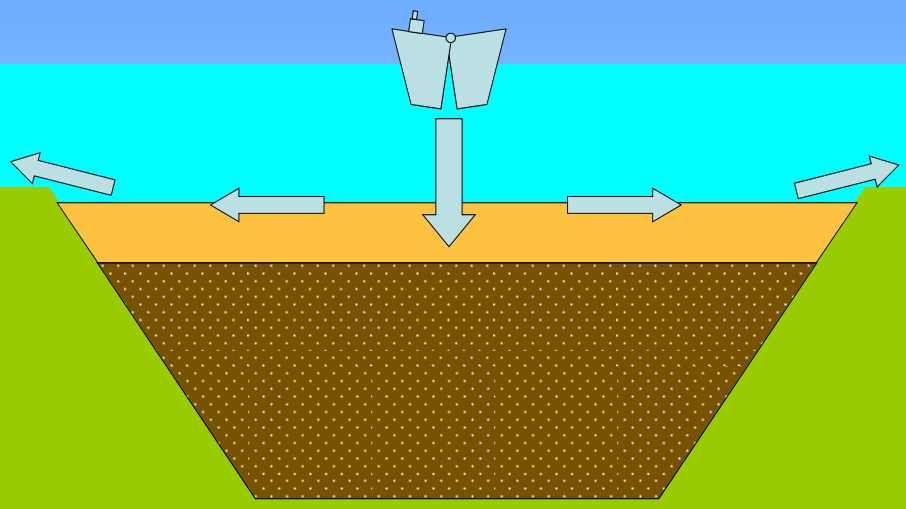
Bulking Considerations



Fluid Loss Conditions



CAD Surge?



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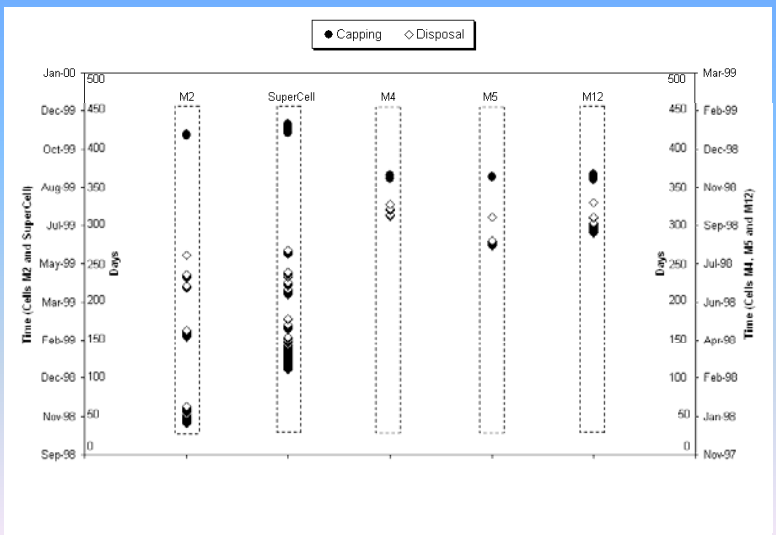
CAD Filling History



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Post Capping Core

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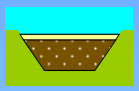
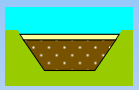
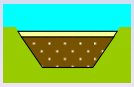
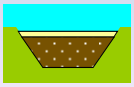
Conclusions

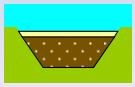
- Need to Balance Environmental Effects of all Alternatives
- Logistics and Cost are Major Drivers
- CADS have a Growing History of Use

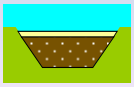












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Further Reading

- Fredette, T. J., P. E. Jackson, C. J. Demos, D. A. Hadden, S. H. Wolf, T. A. Nowak Jr., and. E. DeAngelo. 2000. The Boston Harbor Navigation Improvement Project CAD Cells: Recommendations for Future Projects Based on Field Experience and Monitoring. Proceedings of the Western Dredging Association, Twentieth Technical Conference and Twenty-second Texas A&M Dredging Seminar, June 25-28, Warwick, RI. Pp. 291-302.
- Fredette, T.J. 2006. Why confined aquatic disposal cells often make sense. Integrated Environ. Assess. Man. 2(1): 1-4.
- Wolf, S., M. Greenblatt, T.J. Fredette, D.A. Carey, S. Kelly, R.J. Diaz, P. Neubert, I. Williams, and J.H. Ryther. 2006. Stability and Recovery of Capped in-Channel CAD Cells: Boston Harbor, Massachusetts. Proceedings of the Western Dredging Association Twenty-Sixth Technical Conference and Thirty-Eighth Texas A&M Dredging Seminar, 26-28 June 2006, San Diego, CA. Center for Dredging Studies , Ocean Engineering Program, Civil Engineering Department, Texas A&M University, College Station, TX. Pp. 451-460.

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